Title: Tracking hypoxic conditions via Mo accumulation in coastal sediments: the influence of N loading and local residence time

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One approach to developing nitrogen (N) criteria for coastal waters is to determine quantitative relationships between N loading and ecological effects, such as hypoxia. Hypoxia may vary significantly within estuaries, making it difficult to document over large spatial and temporal scales. Accumulation of molybdenum (Mo) in surface sediments has been proposed as an indicator of the duration of hypoxia in overlying waters, providing a metric to evaluate the relationship between varying N loads and the occurrence and duration of hypoxic conditions in more than a dozen southeastern New England (USA) estuaries. Nitrogen loads were calculated for each estuary based on watershed land use. Because effects of nitrogen are expected to vary with residence time of the nitrogen within estuaries, N loads were normalized in each estuary for volume and local residence times (LRT) derived from hydrodynamic modeling to account for tidal flushing. Multiple sampling sites were selected within each estuary to span a range of normalized N loading, and surface sediments collected at each site for Mo analysis. A linear relationship between the concentration of Mo in surface sediments and the annual duration of hypoxia (defined as dissolved oxygen concentrations below 2.8 mg/L) was derived for southeastern New England estuaries and used to convert Mo concentrations to average annual duration of hypoxia. This presentation will illustrate the spatial distribution of hypoxia derived from the Mo data and the quantitative relationships between N load, residence time and extent/frequency of hypoxia. By combining these relationships with knowledge of hypoxia tolerance in local or critical species, this approach may be useful to evaluate criteria for nitrogen loading in coastal waters.